

REMARKS

By the present amendment and response, claims 33, 45, 51, and 69 have been amended to overcome the Examiner's objections. Claims 33-72 are pending in the present application. Reconsideration and allowance of pending claims 33-72 in view of the following remarks are requested.

The Examiner has rejected claims 33-39, 44, 45, 46-48, 51-57, 62-66, and 69-70 under 35 USC 102(e) as being anticipated by U.S. patent number 6,365,970 B1 to Tsai et al. ("Tsai"). The Examiner has further rejected claims 40-43, 49, 50, 58-61, 67-68, and 71-72 under 35 USC 103(a) as being unpatentable over Tsai. For the reasons discussed below, Applicant respectfully submits that the present invention, as defined by amended independent claims 33, 45, 51, and 69 and independent claim 62, is patentably distinguishable over Tsai. However, Applicant believes that the present invention was conceived and reduced to practice prior to the effective filing date of Tsai. As such, Applicant reserves the right to provide declarations and/or documents under 37 CFR 1.131 to "swear behind" the effective filing date of Tsai.

Subject to Applicant's reserved right to establish priority of the present invention under 37 CFR 1.131, Applicant submits that the present invention, as defined by amended independent claim 33 teaches a composite structure comprising a first metal pad structure comprising a first interconnect metal and a first via pad structure below the first metal pad structure, where the first via pad structure comprises a plurality of segments of a first via metal and a first plurality of dielectric fillers, where at least one of the plurality of

segments of the first via metal contact the first interconnect metal, and where at least two of the plurality of segments of the first via metal are connected. As disclosed in the present application, the present invention provides an improved bonding pad, which is achieved by a novel support structure that provides increased mechanical support below the entire area of the bonding pad. As a part of achieving increased mechanical support to the bonding pad, a via pad structure comprising a number of via metal segments is provided. Each of the via metal segments of the via pad structure is situated below the bonding pad, and thus each of the via metal segments provides a column of solid metal support below the bonding pad.

As part of achieving the invention's improved support structure, the present invention further provides a number of dielectric fillers to the via pad structure. The dielectric fillers improve the invention's support structure by preventing "dishing" in the via pad structure. As a result, the via pad structure achieves an even profile, which is beneficial to the processing of subsequent layers in the IC chip.

Furthermore, the present invention as defined by amended independent claim 33, provides a via pad structure that includes a number of via metal segments that can be advantageously connected together. As set forth in the amended claims, at least two of the via metal segments are connected together to form a metal seal that encloses a number of dielectric filler segments. As a result of the metal seal so formed, cracks that may develop in the dielectric filler segments are prevented from propagating to semiconductor

circuits and devices located outside the metal seal formed by the connected via metal segments.

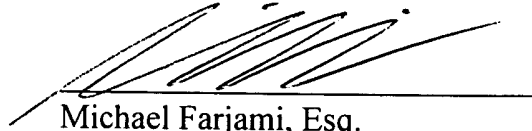
In contrast, Tsai does not teach, disclose, or suggest a first via pad structure below a first metal pad structure, where the first via pad structure comprises a plurality of segments of a first via metal and a first plurality of dielectric fillers, where at least one of the plurality of segments of the first via metal contact the first interconnect metal, and where at least two of the plurality of segments of the first via metal are connected. Tsai specifically discloses bond pad structure 4, which includes at least one sub-structure combination layer 42 formed between two corresponding metal layers 41. See, for example, column 4, lines 41-45 and Figure 4B of Tsai. In Tsai, each sub-structure combination layer 42 includes dielectric layer 421, which further includes via openings formed through itself on first, second, and third areas of dielectric layer 421. See, for example, column 4, lines 41-45 and Figure 4A of Tsai. In Tsai, the via openings are filled with a metal material to form via plugs 423. See, for example, column 4, lines 66-67. Thus, in Tsai, a sub-structure combination layer, i.e. sub-structure combination layer 421, comprises a single dielectric layer, i.e. dielectric layer 421, which includes via plugs 423. Via plugs 423 are individually formed by filling separate via openings with a metal material. Thus, by utilizing separate via plugs 423, Tsai teaches away from utilizing a structure comprising a plurality of segments of a first via metal, where at least two of the plurality of segments of the first via metal can be connected.

Independent claims 45, 51, and 69 have been amended in a manner similar to independent claim 33, and are thus allowable for reasons similar to those discussed above in relation to claim 33. For the foregoing reasons, Applicant respectfully submits that the present invention, as defined by amended independent claims 33, 45, 51, and 69, is not suggested, disclosed, or taught by Tsai. As such, the present invention, as defined by amended independent claims 33, 45, 51, and 69, is patentably distinguishable over Tsai. Thus, respective dependent claims 34-44, 46-50, 52-68, and 70-72 are also patentably distinguishable over Tsai.

For all the foregoing reasons, an early allowance of claims 33-72 pending in the present application is respectfully requested.

Respectfully Submitted,
FARJAMI & FARJAMI LLP

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Michael Farjami, Esq.
Reg. No. 38, 135

Michael Farjami, Esq.
FARJAMI & FARJAMI LLP
16148 Sand Canyon
Irvine, California 92618
Telephone: (949) 784-4600
Facsimile: (949) 784-4601

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the claims:

Claims 33, 45, 51, and 69 have been amended as follows:

33. (Twice Amended) A composite structure in an IC chip, said composite structure comprising:

a first metal pad structure comprising a first interconnect metal;

a first via pad structure below said first metal pad structure, said first via pad structure comprising a plurality of segments of a first via metal and a first plurality of dielectric fillers, at least one of said plurality of segments of said first via metal contacting said first interconnect metal, at least two of said plurality of segments of said first via metal being connected.

45. (Twice Amended) A method for fabricating a composite structure in an IC chip, said method comprising steps of:

fabricating a first via pad structure, said first via pad structure comprising a plurality of segments of a first via metal and a first plurality of dielectric fillers, at least two of said plurality of segments of said first via metal being connected;

fabricating a first metal pad structure above said first via pad structure, said first metal pad structure comprising a first interconnect metal, said first interconnect metal contacting at least one of said plurality of segments of said first via metal.

51. (Twice Amended) A composite structure in an IC chip, said composite structure comprising:

a first via pad structure comprising a first via metal;

a first metal pad structure below said first via pad structure, said first metal pad structure comprising a plurality of segments of a first interconnect metal and a first plurality of dielectric fillers, at least one of said plurality of segments of said first interconnect metal contacting said first via metal, at least two of said plurality of segments of said first interconnect metal being connected.

69. (Once Amended) A composite structure comprising:

a first via pad structure comprising a first via metal;

a first metal pad structure below said first via pad structure, said first metal pad structure comprising a plurality of segments of a first interconnect metal and a first plurality of dielectric fillers, at least one of said plurality of segments of said first interconnect metal contacting said first via metal;

a second via pad structure below said first metal pad structure, said second via pad structure comprising a plurality of segments of a second via metal and a second plurality

of dielectric fillers, at least one of said plurality of segments of said second via metal contacting said first interconnect metal, at least two of said plurality of segments of said second via metal being connected.